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Changing Prices, Changing Cigarette Consumption

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Local, state, and national policy makers need to fully understand the impact of price and reflect that insight and understanding in their tobacco-use education programs, in their decisions on the tobacco program, and in their decisions on efforts to assist producers and producing communities who will bear the brunt of coming adjustments.

What is the impact of the announced price increases on United States tobacco consumption? Following the nationally negotiated settlement between state attorneys general and tobacco companies, three groups are extremely interested in the answer to this question. The health community, interested in the health ramifications of tobacco use, wants to know what, if any, decreases in usage will result from price increases to pay for the settlement. The tobacco community, concerned about the future of United States tobacco production, is wondering what price increases will mean to production quotas and to the tobacco program. Policy makers, interested in any reduction in consumption, are considering the ramifications of price increases for administration of the tobacco program and for health costs.

Retail-level price data are not readily available. The Economic Research Service, United States Department of Agriculture (USDA) data give the 1998 price of $1.95 per pack as the median retail price of cigarettes *prior to* the significant increase of $0.45 per pack that the companies announced in November 1998 (Table 1). That $0.45 per pack increase suggests the median price by late 1999 or early 2000 could be about $2.40 per pack or a 23 percent increase in the cost of cigarettes to consumers.

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Table 1. Retail Price of Cigarettes, 1975-1998

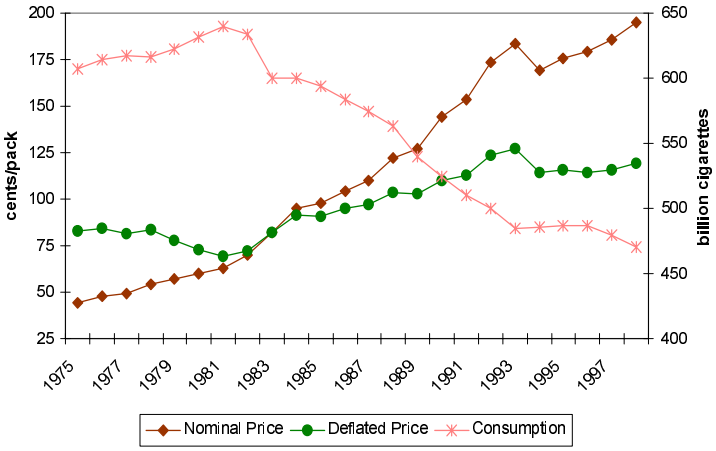
Year	Median Retail Price		U.S. Consumption
	---------(cents/pack)--------		(billion cigarettes)
	Nominal	Deflated	
1975	44.5	82.7	607
1976	47.9	84.2	614
1977	49.2	81.2	617
1978	54.3	83.3	616
1979	56.8	78.2	622
1980	60.0	72.8	632
1981	63.0	69.3	640
1982	69.7	72.2	634
1983	81.9	82.2	600
1984	94.7	91.4	600
1985	97.8	91.0	594
1986	104.5	95.3	584
1987	110.0	96.8	575
1988	122.2	103.3	563
1989	127.5	102.8	540
1990	144.1	110.0	525
1991	153.3	112.7	510
1992	173.5	123.9	500
1993	183.7	127.2	485
1994	169.3	114.2	486
1995	175.8	115.4	487
1996	179.6	114.5	487
1997	185.4	115.5	480
1998	195.0	119.6	470

Source: ERS, USDA Tobacco Specialists and Tobacco Briefing Room, ERS, USDA, May 1999.

The column of deflated prices (Table I) shows cigarette price with inflation removed using the Consumer Price Index (CPI) with 1982-84=100. Prices have increased 46 percent in inflation-adjusted terms since 1982-84, from $0.82 to almost $1.20. (The price for 1982-1984 was $0.819 per pack.) Cigarette prices have, thus, increased much faster than overall prices as measured by the CPI. A $2.40 price for late 1999 would equate to a deflated price of about $1.44, up sharply from the 1998 deflated price of $1.20.

The impact of prices on smoking by young people is of special interest to all those involved in the dialogue surrounding tobacco use. Generally, higher prices are expected to discourage youth from starting to smoke and would also be expected to reduce the rate of smoking after smoking has become a habit. The price increases from 1975 through 1998 shown in Table 1 are not extremely large on a year-to-year basis when the prices are converted to an inflation-adjusted series. The abrupt increase in price in late 1998 *is large* and will amount to more than a 20 percent increase in inflation-adjusted prices from 1998 through 1999. Such a large increase in price will significantly influence consumption.

Figure 1. U.S. Domestic Cigarette Consumption and Retail Prices, 1975-1998



The other side of the coin is also present and merits special attention. In August 1993, the tobacco companies reduced the wholesale price of premium brands of cigarettes by 24 to 27 percent (ERS, Table 8). Median nominal retail prices for 1994 were down almost 8 percent, from 183.7 cents per pack to 169.3 cents. Prior to the price cut, the consumption of cigarettes had trended down from a high of 640 billion pieces in 1981 to 485 billion in 1993, an average decline of 12.9 billion pieces across the period. That significant downward trend was stopped by the price cut (Figure 1), and it was 1997 before consumption again dipped below 485 billion pieces.

The abrupt halt to the decline in consumption was related to the price cuts. When the influence of inflation is removed, prices in 1994 through 1997 were 10 percent below the 1993 price, and price was still down nearly 6 percent in 1998 . *After the price cut by the tobacco companies in 1993, the typical consumer's ability to buy cigarettes increased significantly*. Overall prices—and overall wages—were going up much faster from 1993 through 1998 than were cigarette prices. More will generally be taken of any product or service at lower prices, reflecting the widely referenced "law of demand." The law says that consumers will take, at any point in time, more quantity only at lower prices. Clearly, price cuts can be used to stimulate consumption.

> The price cut in 1993 stopped, for a number of years, a large and sustained decrease in domestic cigarette consumption.

The Role of Elasticity of Demand

Elasticity of the demand for any product or service is defined as percent change in quantity divided by percent change in price. In practical terms, the concept is very useful in determining what, if any, sales might be lost from announced price increases. Alternatively, business firms might be interested in what happens to total revenue received from the sale of any product or service when the selling price is changed.

Elasticity is typically divided into two broad categories: *elastic* and *inelastic*. Generally, the demand for a particular product or service is said to be *price elastic* when the percentage change in quantity divided by the percentage change in price exceeds one. Alternatively, the demand for products or services is considered to be *price inelastic* when that same ratio is less than one. Since price and quantity move in opposite directions along a negatively sloping demand curve from one price-quantity coordinate to another, the ratio is always negative. Thus, the interest is in whether elasticity is greater than one or smaller than one, regardless of sign.

Chaloupka and Grossman estimate the price elasticity of demand for cigarette use among young people ages 18 to 25 at approximately -1.3. This elastic demand suggests young smokers change quantity consumed a great deal in response to a price change. It is about three times as large as is researchers' estimate of the measure of elasticity of demand for all smokers, which is around -.45. *Reductions in youth smoking as the result of price increases are about evenly divided between those who never start to smoke and those already smoking who decrease their consumption,* the researchers conclude. These findings suggest that price decreases are very effective in attracting young people to cigarette consumption: The 1993 price cuts would have encouraged many young people to start smoking.

In inflation-adjusted terms, the 1993 to 1994 retail price decrease was slightly more than 10 percent. An elasticity of -1.3 suggests a 13 percent increase in smoking in response to that price decline. Changes in consumption behavior take time. But the price decline of 10 percent in inflation-adjusted terms persisted through 1997, enough time for behavior changes to occur. Table 1 and Figure 1 show a negative trend in consumption with declines averaging nearly 13 billion pieces per year up to 1993. If that negative trend had continued from 1994 through 1997, a further cumulative decrease of 52 billion pieces would have been expected. This 52 billion-piece decrease—blocked by the price cuts—would have been about 11 percent of the 485 billion-piece consumption of 1993. Eleven percent is in line with the 13 percent response from young people we would expect as the result of a 10 percent price cut. The long-standing downward trend in consumption was stopped by the price decreases. *The single price-cutting move in 1993 may have more than offset all the public and private education and enforcement efforts to keep young people from starting to smoke during the 1993 to 1998 period.*

Price decreases are very effective in attracting young people to cigarette consumption.

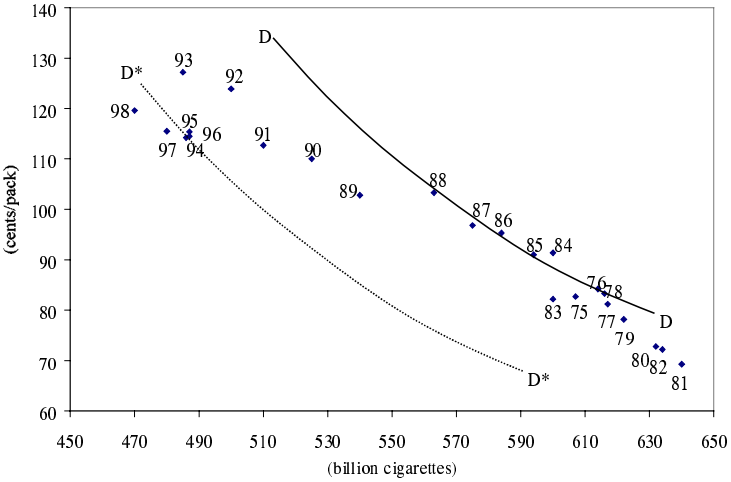
The important message is that cigarette consumption is strongly influenced by price, especially for younger people. When prices go down, consumption is encouraged. When prices go up, consumption is discouraged. And another important influence is obviously possible: consumption can be significantly influenced by sellers' carefully considered policies on pricing.

Figure 2 shows a scatter plot of consumption and inflation-adjusted cigarette prices since 1975 with the years identified in the diagram. If elasticity of demand has remained near -.45 for all smokers, the demand curve will have to get steeper at higher prices and lower quantities (as Figure 2 suggests) to continue to exhibit an elasticity of -.45. A demand curve, labeled DD, has been sketched through, for illustrative purposes, the 1985 price/consumption coordinate.

The Rule of "Do Something"

By 1989 and 1990, the data suggest the United States industry was no longer on DD, but on some lower demand curve. A demand curve passing through 1989 or 1990 must be below and to the left of curve DD. And as the 1990s developed, demand—even though it was being boosted by 1 percent yearly population growth—appears to have continued to shift lower. A demand curve parallel to DD but through the 1994 or 1995 coordinates results in D*D*, a much lower demand curve than DD. Technically, D*D* would need to be steeper to continue to represent an elasticity of -.45. However, a parallel shift demonstrates the point: As demand decreases, the curve representing price/quantity combinations shifts down. To sellers, this shift has ominous and well-known implications: *Consumers will take the same quantity of product sold in the prior year only at a lower price.* In the corporate boardroom, a sometimes-panicky effort to "do something" takes place.

Figure 2. Inflation-Adjusted Price (CPI, 1982-84=100) and Consumption of Cigarettes, 1975-1998



The graphic clearly shows the flight of consumers as quantity consumed went down sharply from the early 1980s. The data in the graph also show that the backing away from quantity consumed was not due only to the higher prices up to 1993. Demand was decreasing at the same time. A growing lack of willingness to pay for and use tobacco was occurring, a trend that was compounding the market problems facing the cigarette manufacturers.

The companies followed the rule of "do something." The big price cut in 1993 halted the rapid decline in consumption that started in the early 1980s and was gathering momentum through early 1993. The price cut held consumption near 487 billion pieces through 1996 before a modest decline in 1997 and a somewhat bigger decline in 1998. Consumption was maintained via the price cut, and a substantial part of maintaining that consumption came in the form of young people being encouraged to start smoking. *The -1.3 estimate of elasticity for young smokers guarantees that they would be the group that responded the most to the price decline.*

What the graph will show for 1999 depends on how much of the price increase of late 1998 reaches the consumer and how quickly the price increase hits. If the inflation-adjusted price moves up toward $1.40, consumption may be below 450 billion pieces and off the graph in Figure 2. *A big part of that decline will be because young men and women do not start to smoke, given the now higher prices.* A 20 percent price increase would bring a 26 percent reduction in smoking if the -1.3 elasticity still holds. Twenty-six percent is a large effect and suggests that the U.S. tobacco market will, in fact, be impacted in a very significant way by the price increase announced by the tobacco companies.

Some cautions need to be applied in using this finding. Perhaps the most significant is the fact that a 20 percent, one-time increase in price will move the price level outside the range of data from which the elasticity estimate was generated. Extrapolating and using statistical measures outside of the range of data employed in the estimation process is always dangerous. *But even given due consideration to this caution, this price increase will have a major impact on smoking, especially by young smokers.* Such a reduction is consistent with the observation by a number of national policy analysts who have argued that a substantial increase in the federal excise tax on cigarettes would increase prices and significantly curtail tobacco usage. In recent years, increases as high as $1.50 per pack have been discussed, with the possibility of a $.50 per pack increase in federal excise tax being accepted as more realistic by most observers. That tax increase discussion has essentially disappeared, but the basic issue of increased price remains. In this current instance, a per pack price increase, almost as large as the discussed $.50 per pack federal excise tax, is coming from the tobacco companies seeking ways to finance the settlement.

The pricing strategy by the companies may be a very practical one. When looking at the entire smoking community in the United State, most researchers estimate the price elasticity of demand in the neighborhood of -.4 to -.5 (Chaloupka and Grossman). Using an elasticity of demand of -.45 and increasing the price of cigarettes by 20 percent could actually increase total revenue to the firms selling the cigarettes. Revenues increase because, in the inelastic portion of the demand curve, the increase in price is substantially larger in percentage terms than the accompanying percentage decrease in quantity consumed. That result also fits most observers' intuition that people who smoke will tend to continue to smoke, often irrespective of price, and that price will not have a large impact on consumption of habitual smokers. *Thus, selling a smaller quantity of cigarettes domestically could raise total revenue to the tobacco companies*. What happens to their total costs and to their profits is somewhat of an unknown. Companies would buy and employ less of the raw tobacco that goes into the finished product, but tobacco costs are only 2 to 3 cents of total per pack costs. Per pack costs would be increasing since other costs, especially fixed costs (equipment, buildings, taxes, insurance, even some personnel costs), would be spread across a smaller volume of operation. But the announced higher prices will not necessarily destroy manufacturers' profit positions.

Higher prices do not mean manufacturers will be less profitable. Total dollars from cigarette sales are likely to increase because of the inelastic demand for cigarettes.

These observations document the importance of looking at pricing policies of the cigarette companies when evaluating the consumption of tobacco. Any policy consideration that involves concern about health costs and usage of a product that is allegedly addictive has to take into consideration the price at which the product is being offered to the consuming public. Clearly, pricing policies can enhance usage. The pricing decisions of the early 1990s, when the companies significantly reduced the price of name-brand cigarettes, showed the use of lower prices to encourage consumption. Some felt that this one, significant reduction in cigarette prices more than offset all of the educational programs and increased monitoring of retail outlets being used to discourage young people from starting to smoke. The question of whether the price decrease did, in fact, neutralize the youth smoking prevention programs cannot be answered without looking empirically at what happened. But even a qualitative and largely descriptive appraisal of the situation confirms pricing policies are very important when considering tobacco usage and attitude of society toward it.

The Future of the Tobacco Producer

The analytical framework also has something very important to say about the future of producers. The large -1.3 elasticity for young smokers suggests the already-announced price increases by the companies will have a huge impact on future consumption in the U.S. domestic market. High prices keep many young men and women from starting to smoke, and the survey data show people do not usually start smoking after age 21. *Unless this decrease in domestic*

consumption is offset by growth in export markets, quotas could be decreased even further in future years. The domestic consumption impacts of already-announced cigarette price increases, thus, need to be brought into consideration when the tobacco program and the future of tobacco producers are being discussed, debated, and analyzed.

The nature of the impact of price increases for cigarettes on producers will depend on whether the traditional tobacco program is in place. If the current program of controlling supply by announced quotas and supporting prices is continued, the impact of the price increases will be in the form of further quota reductions. Historically, rapid growth in exports has sometimes offset declines in domestic consumption, but exports may not increase that fast in 2000 and beyond. The price increase is at unprecedented levels and will prompt long-term, cumulative reductions in domestic consumption. The young men and women who do not start smoking in 1999 will be added to by a significant and additional set of young men and women who do not start smoking in 2000. The 1999 reduction in consumption may not be huge, but the cumulative effect by the year 2005 *will* be huge. If the program is still in place, quota cuts beyond 2000 will likely bring further consolidation of farms and accentuate the exit of farms, especially small farms, from tobacco production.

> The longer run and cumulative effect of the price increase could help prompt more quota cuts in coming years.

If the tobacco program is abolished, the impacts will come more nearly in the form of declines in tobacco prices. Manufacturers will contract with producers at prices consistent with global prices and world trade possibilities. The Economic Research Service estimated the cost of producing flue-cured tobacco, excluding land and quota costs, at $1.35 per pound for 1997 (ERS). Selling prices in recent years have varied from the low $1.70s to the low $1.80s. A price of $1.75 is $0.40 above the per pound costs. In agricultural commodities in a deregulated global marketplace, United States commodity prices always tend to go down toward world prices or to the cost of production. Any price above costs represents economic rent (sometimes called excess profits) and cannot be sustained unless a barrier to expanded production—such as the current tobacco program—exists. *The lower prices will have essentially the same impact on producers' revenue as program-related quota cuts.* Small-scale farmers will be forced out as production is consolidated in larger units that can reap economies of size, push costs down, and compete. The location of United States production would also be different. The current tobacco program prohibits production from moving freely from one geographic area to another. Without the program, production will move to areas where costs of production are low, possibly including areas where tobacco is not currently produced.

> If the tobacco program is eliminated, lower prices will force higher cost producers out of business and could change where tobacco is produced in the United States.

Price is an important economic force. The 1993 price cuts protected United States manufacturers from further reductions in consumption, protection that lasted into 1997. Conversely, the 1998 price increase for cigarettes will start a round of responses that eventually will significantly reduce domestic consumption of cigarettes. The 1998 pricing decision will accelerate the trends away from smoking that started in 1981, and those 1998 pricing decisions will accelerate adjustments at the producer level. Local, state, and national policy makers need to fully understand what is happening and reflect that insight and understanding in their tobacco-use education programs, in their decisions on the tobacco program, and in their decisions on efforts to assist producers and producing communities who will bear the brunt of coming adjustments.

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